

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Service Rules for Advanced Wireless Services)	WT Docket No. 02-353
In the 1.7 GHz and 2.1 GHz Bands)	
)	

To: The Commission

COMMENTS OF ARRAYCOMM, INC.

ArrayComm, Inc. (ArrayComm),¹ submits these comments in response to the Federal Communications Commission's (Commission or FCC) *Notice of Proposed Rulemaking (NPRM)* in the above-captioned proceeding.²

I. INTRODUCTION

In the *NPRM*, the FCC seeks comment regarding eligibility, licensing, operating and technical rules, band plans and competitive bidding, among other topics, to assist it in creating service rules that will meet the needs of anticipated service providers and the serve the public. The Commission concludes that its proposals "allow flexibility for licensees to provide third generation (3G) and other advanced wireless services in the near term, while fostering innovation and agility so they can quickly adapt to changes in technological capabilities and marketplace

¹ ArrayComm, Inc. is the world leader in smart antenna technology. ArrayComm's patented IntelliCell® technology – based on fully adaptive smart antennas – creates dedicated personal cells of voice or data for wireless subscribers. IntelliCell technology is also the key ingredient behind ArrayComm's innovative i-BURST™ system – the only wireless Internet access system that offers the freedom of mobility with the high speed of DSL at consumer pricing. The company has more than 200 patents issued or pending worldwide.

² Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Notice of Proposed Rulemaking*, FCC 02-305, (rel. Nov. 22, 2002) (*NPRM*).

conditions into the future.”³ The FCC also states that its proposals promote “intensive and efficient use of this spectrum.”⁴

Innovation and efficient use of spectrum are goals with which ArrayComm concurs. However, ArrayComm is concerned that these goals will be paid only lip service if the rules adopted simply result in the provision of voice service in this spectrum without any requirement to operate more efficiently or offer affordable broadband services. This reallocation presents the FCC an opportunity to encourage real innovation, by licensing a portion of the spectrum on an unpaired basis to encourage deployment of mobile data service, or to at least require more of licensees in the way of spectral efficiency. To that end, ArrayComm will comment briefly on the issues of spectrum blocks and pairing, aggregation and performance requirements.

II. SPECTRUM BANDS AND PAIRING

In the *NPRM*, the FCC seeks comment on whether it should adopt a band plan consisting of paired spectrum bands, ideal for wireless voice services employing Frequency Division Duplexing (FDD), unpaired bands more suitable to asymmetrical data transmission using Time Division Duplexing (TDD), or a combination of both. While such neutrality is proper and commendable, certain considerations preclude the inclusion of TDD-based services in these bands. The spectrum bands at issue have been matched (2 x 45 MHz) and have been deemed the next step for domestic 2G providers to expand their capacity and, perhaps, service offerings. In fact, the FCC has worked painstakingly with the industry and the NTIA over the past several years to find such a suitable “pair” of bands. The FCC has stated that it intends to employ this

³ *NPRM*, at ¶ 2.

⁴ *Id.* at ¶¶ 11.

spectrum to further harmonize the U.S. 3G allocation with that of the rest of the world.⁵ These considerations lead to the inescapable conclusion that a paired band plan will be adopted.

A plan in which all blocks are unpaired will certainly be opposed by FDD proponents, citing their need for certainty with respect to transmit and receive paths, especially if they need to roam across license boundaries, *e.g.*, among different operator's systems. If FDD is to be accommodated in this spectrum, FDD block pairs will have to be identified in advance (as opposed, *e.g.*, to having to bid separately on uplink and downlink portions and hope of assembling pairs with the right spacing). A band plan combining paired and unpaired blocks would be even more complex. In practical terms, there appears to be little point to debating flexible band plans combining FDD and TDD modes of operation.

Nevertheless, the FCC should not abandon its noble inclination toward technology neutrality. Although rules of operation favoring FDD systems seem unavoidable for the 90 MHz under consideration here, the Commission must not continue to ignore mobile broadband services using TDD spectrum, leaving them to subsist on tiny slivers of spectrum of 5 MHz or less or the uncertain landscape of unlicensed spectrum.

Based on industry metrics, with current FDD capacity and spectral efficiency, we know that the cost per Mbyte for mobile data services is about two dollars. For the amount of data used by a typical dial-up Internet user, this charging rate would translate to \$ 100/month or more just for the data access, and a premium of about a factor of ten over landline pricing. It is very clear that when we offer Mobile Broadband service, there is no scope for a large “premium” for

⁵ Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, ET Docket No. 00-258, *Second Report and Order*, FCC 02-304, (rel. Nov. 15, 2002), at ¶¶ 24 and 40.

mobility. Only TDD-based technologies have demonstrated the ability to meet the cost and performance parameters necessary to offer mobile broadband services to consumers.⁶

Allocation and assignment of unpaired spectrum may be the only way to help mobile broadband services take root in the United States. The ITU has recommended allocation of TDD spectrum on a global basis,⁷ and the FCC should accommodate the ITU's approach with respect to TDD as it has in this proceeding for FDD. ArrayComm requests that the FCC commit itself to expeditiously identify and allocate appropriate spectrum for TDD services, consistent with the "Good Neighbor" Incentive recommendation of the Spectrum Policy Task Force.⁸ For example, the Commission's recent actions related to reallocation of Mobile Satellite Service spectrum may offer a number of potential "neighborhoods" for mobile broadband services.

III. SPECTRUM AGGREGATION LIMITS AND PERFORMANCE REQUIREMENTS

The CMRS spectrum cap expired on of January 1, 2003.⁹ In other words, applicants in the 1.7 GHz and 2.1 GHz AWS bands will not be constrained by generalized spectrum aggregation limits. In the *NPRM*, the FCC also tentatively concludes that it need not adopt any band-specific service rules addressing spectrum aggregation limits for the initial licensing of these bands. Consistent with the approach taken in the Spectrum Cap Order, however, the

⁶ See "Spectrum: Applications, Trends, and the Crunch for Spectrum," presented by Nitin Shah, Chief Strategy Officer, ArrayComm, Inc., to the September 18, 2002, meeting of the FCC Technological Advisory Council, http://www.fcc.gov/oet/tac/Nitin_Shah_9.18.02_Tac_Talk_Final.pdf (slide 16).

⁷ See Draft Revision of Recommendation ITU-R M.1036-1, Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications-2000 (IMT-2000) in the bands 806-960 MHz, 1710-2025 MHz, 2110-2200 MHz and 2500-2690 MHz, Document 8/112-E, Oct. 17, 2002, at 8, Table 2.

⁸ *Spectrum Policy Task Force Report*, ET Docket No. 02-135, (rel. Nov. 2002) (*SPTF Report*), at 22.

⁹ See 47 C.F.R. § 20.6. See also See 2000 Biennial Regulatory Review: Spectrum Aggregation Limits for Commercial Mobile Radio Services, WT Docket No. 01-14, *Report and Order*, 16 FCC Rcd 22668 (2001), *recon. pending*.

Commission seeks comment on whether any such limits are necessary or appropriate.¹⁰ The Commission also asks whether there should be any set-asides for new entrants or other types of applicants, noting that it has limited eligibility in the past to maximize competition by ensuring that at least some licenses go to new entrants.¹¹

ArrayComm is not in favor of precluding any interested party from the opportunity to acquire spectrum by auction. However, ArrayComm does see the utility of imposing greater requirements and responsibilities on licensees, as they acquire more spectrum. Where to draw the line between the rules proposed in the *NPRM* and additional, perhaps more stringent, requirements as to spectral efficiency is difficult to say. ArrayComm believes, however, that unless forced, the wireless voice providers will continue to provide more of the same service, offering new applications and improved efficiency at a glacial pace. And before long they will be back at the FCC asking for still more spectrum, instead of utilizing readily available technology, to address capacity constraints.¹²

Throughout the history of radio, spectrum users have been forced to become more efficient either by their inability to acquire additional spectrum or by governmental mandate. Of late, the Commission has shown no inclination to withhold spectrum. Perhaps the FCC should follow the other route to efficient use of spectrum. Why not ask more of these licensees? If there is to be no limit on the amount of spectrum a provider may acquire, should that provider at least be required to use that spectrum efficiently?

¹⁰ *NPRM* at ¶ 41.

¹¹ *NPRM* at ¶ 42.

¹² The recent resolution of the NextWave controversy may also make more prime spectrum available to the wireless voice providers, some believe, at bargain prices.

Contrary to the Spectrum Policy Task Force Report, which urges the FCC to abandon efforts to measure spectrum efficiency and concludes “technical efficiency does not provide any information with respect to economic efficiency,”¹³ meaningful measures of performance can and have been developed. Many of the economic arguments in the industry made for one technology versus another are based on technical efficiency.¹⁴

It is true that a single metric and a single performance level will not be appropriate for all services. One metric may be required for voice systems, *e.g.*, simultaneous calls/Hz/cell. Another may be required for data services, *e.g.*, bits/second/Hz/cell or bits/second/Hertz/km². All two-way commercial and consumer services — which use a significant portion of the spectrum actively managed by the Commission — could certainly be organized into a small number of categories for which meaningful spectral efficiency metrics could be created and used to determine not only the baseline performance of today’s systems, but achievable targets for future systems.

Improving the efficiency of spectrum usage will be an evolutionary process, requiring technical and economic performance targets that evolve over time, as well as metrics that can be used to gauge the effectiveness of technologies. We strongly urge and even challenge the FCC to take the first step to develop efficiency targets in this proceeding. The FCC can do so within the authority granted by the Communications Act. Section 309(j)(3) provides that “the Commission shall...seek to promote...economic opportunity and ensur[e] that new and innovative technologies are readily accessible to the American people by avoiding excessive

¹³ *SPTF Report* at 21.

¹⁴ *See, e.g.*, <http://www.qualcomm.com/main/whitepapers/WirelessMobileData.pdf> (“The Economics of Mobile Data”).

concentration of licenses....”¹⁵ The Commission is also charged with promoting “efficient and intensive use of the electromagnetic spectrum....”¹⁶

ArrayComm urges the Commission to institute a Notice of Inquiry to more fully investigate the efficacy of incremental efficiency metrics and targets for application to the current 90 MHz of AWS spectrum and for future AWS allocations.

IV. CONCLUSION

ArrayComm acknowledges the inevitability of a paired spectrum band plan for the spectrum at issue, but requests that the Commission expeditiously identify and allocate a comparable amount of unfragmented unpaired spectrum suitable for mobile broadband services. ArrayComm urges the FCC to follow the recommendation of the Spectrum Policy Task Force to allocate such spectrum in a manner that provides for technically compatible systems in close spectrum proximity or “spectrum neighborhoods.” The longer the FCC avoids the spectrum needs of mobile data services, the longer American consumers will have to wait for a cost-effective and spectrally efficient alternative to conventional wired broadband services.

ArrayComm also concludes that spectral efficiency targets seem a reasonable price to pay for the ability to acquire an unlimited amount of spectrum. For that reason, ArrayComm requests that the Commission initiate a proceeding toward developing spectral efficiency targets, as suggested above, to be applied to licensees that acquire spectrum above an amount to be determined by the Commission. Service providers must have an incentive to adopt more

¹⁵ 47 USC § 309(j)(3)(B).

¹⁶ 47 USC § 309(j)(3)(D).

spectrally efficient technologies. In addition to flexible use and competitive markets, the Commission should add efficiency targets to hasten the pace of innovation, to ensure that spectrum is more efficiently utilized, and to lower the cost of service to consumers.

Respectfully submitted,

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